

THE CLAIMS

We claim:

1. An orthopedic implant comprising an implant element for surgical insertion into a bone or bone-related tissue and of a patient, said implant element comprising an ordered microgeometric, repetitive surface pattern in a form of a multiplicity of substantially parallel alternating ridges and grooves, each having an established width in a range of about 2 to about 25 microns, and an established depth in a range of about 2 to about 25 microns,
whereby said micro-geometric repetitive pattern defines a guide for a preferential promotion of the rate, orientation and direction of growth of colonies of cells of said bone which are in contact with said surface pattern.
2. The implant as recited in Claim 1, in which said implant element comprises an orthonormal matrix of said pattern of alternating ridges and grooves.
3. The implant as recited in Claim 1, in which said multiplicity comprises a first multiplicity of said alternating ridges and grooves includes an axis co-parallel with a major axis of said implant.

4. The implant as recited in Claim 3 comprising a second multiplicity of said alternating ridges and grooves transverse to said major axis of said first multiplicity.
5. The implant as recited in Claim 1 in which base materials of said implant are selected from the group consisting of the materials of titanium and alloys thereof, stainless steel, ceramics, biocompatible glass and combinations thereof.
6. The implant as recited in Claim 2 in which said orthonormal matrix is oriented diagonally relative to a major axis of the implant.
7. The implant as recited in Claim 1 in which said repetitive micro-geometric pattern of ridges and grooves comprises application to surfaces of said implant element in orientations which, relative to a longitudinal axis of said implant, are selected from the group consisting of vertical, horizontal, orthonormal diagonal, radial, circumferential, and concentric orientations.
8. The implant as recited in Claim 5 in which a surface of said implant element comprises a coating selected from the group of surfaces consisting of hydroxyapatite, RBM roughening, titanium, plasma

sprayed, calcium sulfate, biocompatible glass, collagen, growth factor compounds, and combination thereof.

9. The implant as recited in Claim 1 in which said orthopedic implant is selected from the group consisting hip, knee, shoulder, elbow, ankle and finger implants.
10. The implant as recited in Claim 9 in which said implants are selected from the group consisting of bone and soft tissue anchors.
11. The implant as recited in Claim 9 in which said repetitive micro-geometric pattern comprises a product of the process selected from the process group consisting of laser etching, acid etching, mechanical etching, and photolithography.
12. The implant as recited in claim 9 comprising different zones furnished with respectively different surface patterns.
13. The implant as recited in Claim 12 in which said different zones include respective hard and soft tissue contact zones.